US006050297A

United States Patent [19]

Ostrowski et al.

[11] **Patent Number: 6,050,297**

[45] **Date of Patent: Apr. 18, 2000**

[54] **BREAKAWAY HOSE COUPLING FOR FUEL DISPENSERS**

[75] Inventors: **Gary M. Ostrowski**, Salisbury, Md.; **James David DiRocco**, Delmar, Del.

[73] Assignee: **Dresser Industries, Inc.**, Dallas, Tex.

[21] Appl. No.: **09/193,571**

[22] Filed: **Nov. 17, 1998**

[51] **Int. Cl.**[7] **F16L 37/28**

[52] **U.S. Cl.** **137/614.04**; 137/614.03

[58] **Field of Search** 137/614.04, 614.03, 137/614, 614.02; 251/149.6

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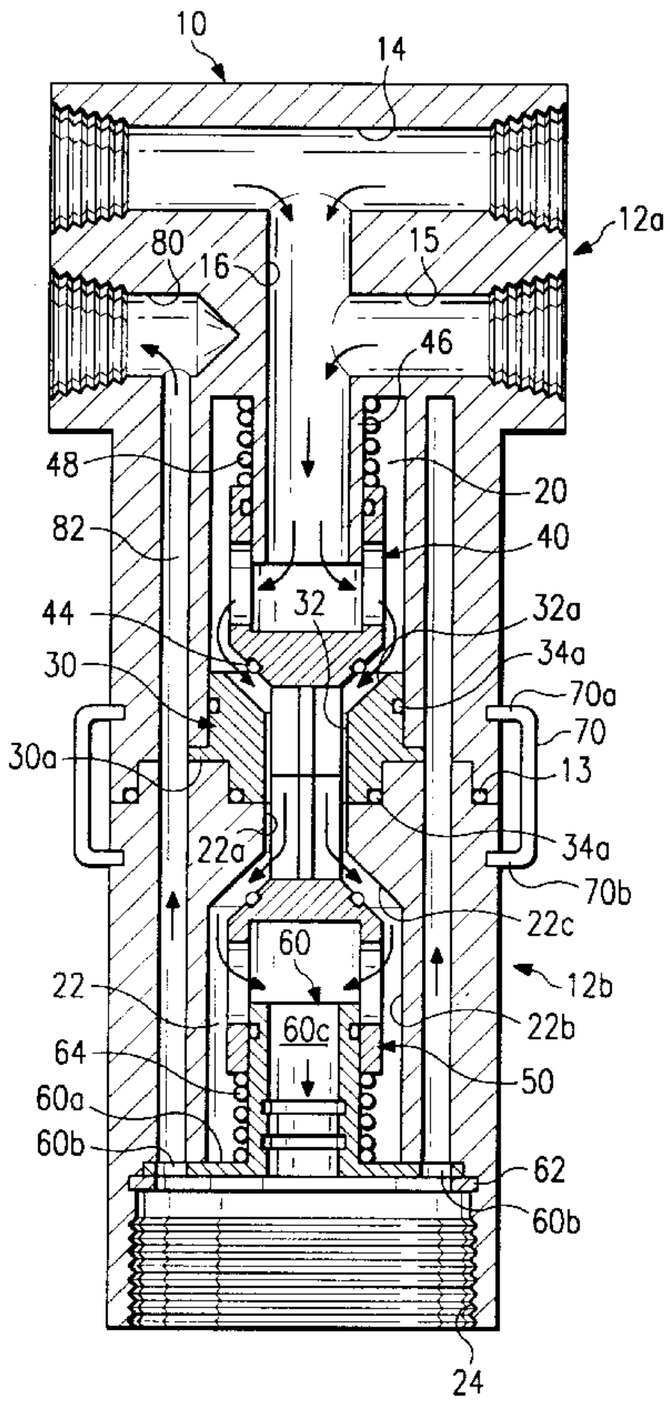
Primary Examiner—Gregory L. Huson
Assistant Examiner—Joanne Y. Kim
Attorney, Agent, or Firm—Haynes & Boone, L.L.P.

[57] **ABSTRACT**

A breakaway hose coupling according to which a removable housing is detachably connected to a fixed housing. A sealing member in the fixed housing is urged towards a seat in the fixed housing to prevent fluid flow through the fixed housing, and a member in the second housing is urged into engagement with the sealing member in the first housing to urge the latter sealing member away from the seat. The connection between the housings is released in response to a predetermined force acting on the second housing and the member in the second housing disengages from the sealing member in the first housing. As a result, the sealing member in the first housing is urged against the seat to prevent fluid flow through the fixed housing.

4 Claims, 4 Drawing Sheets



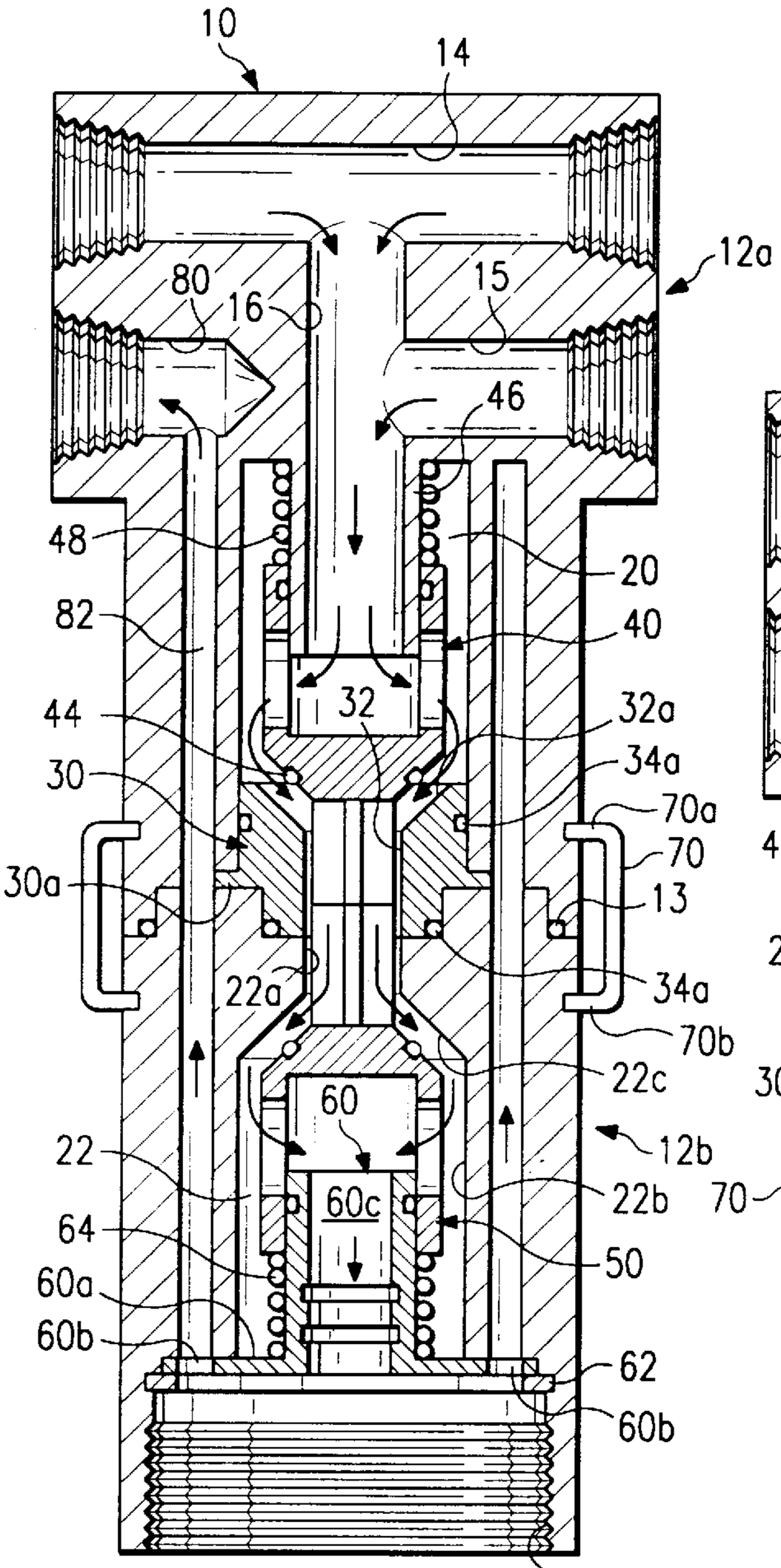


Fig. 1

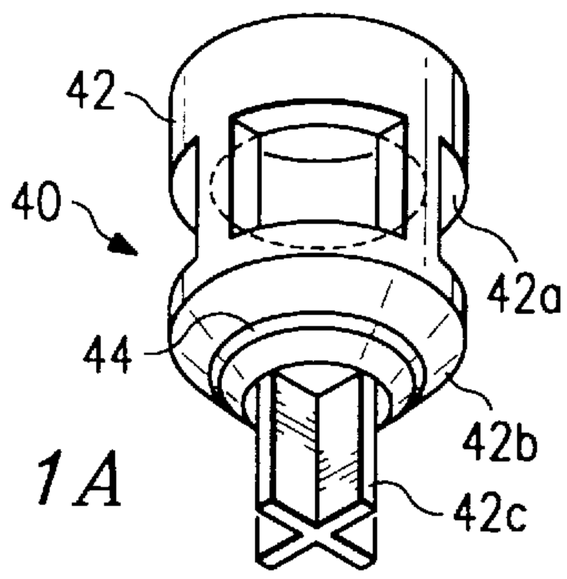


Fig. 1A

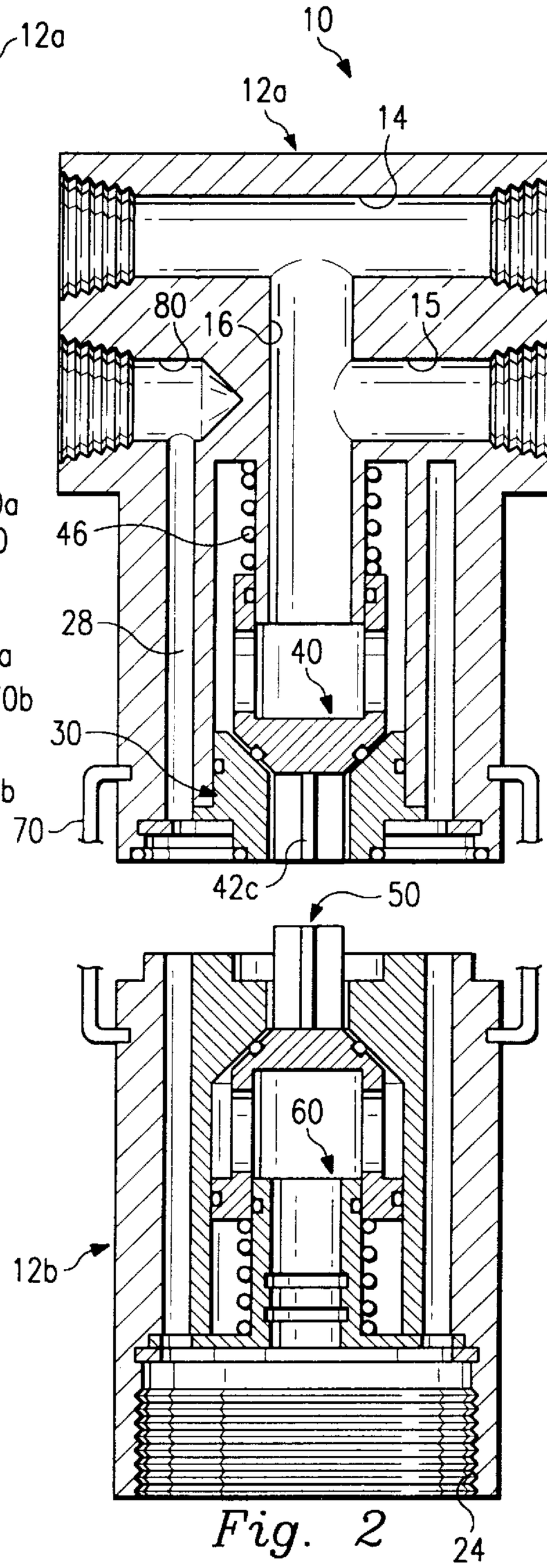


Fig. 2

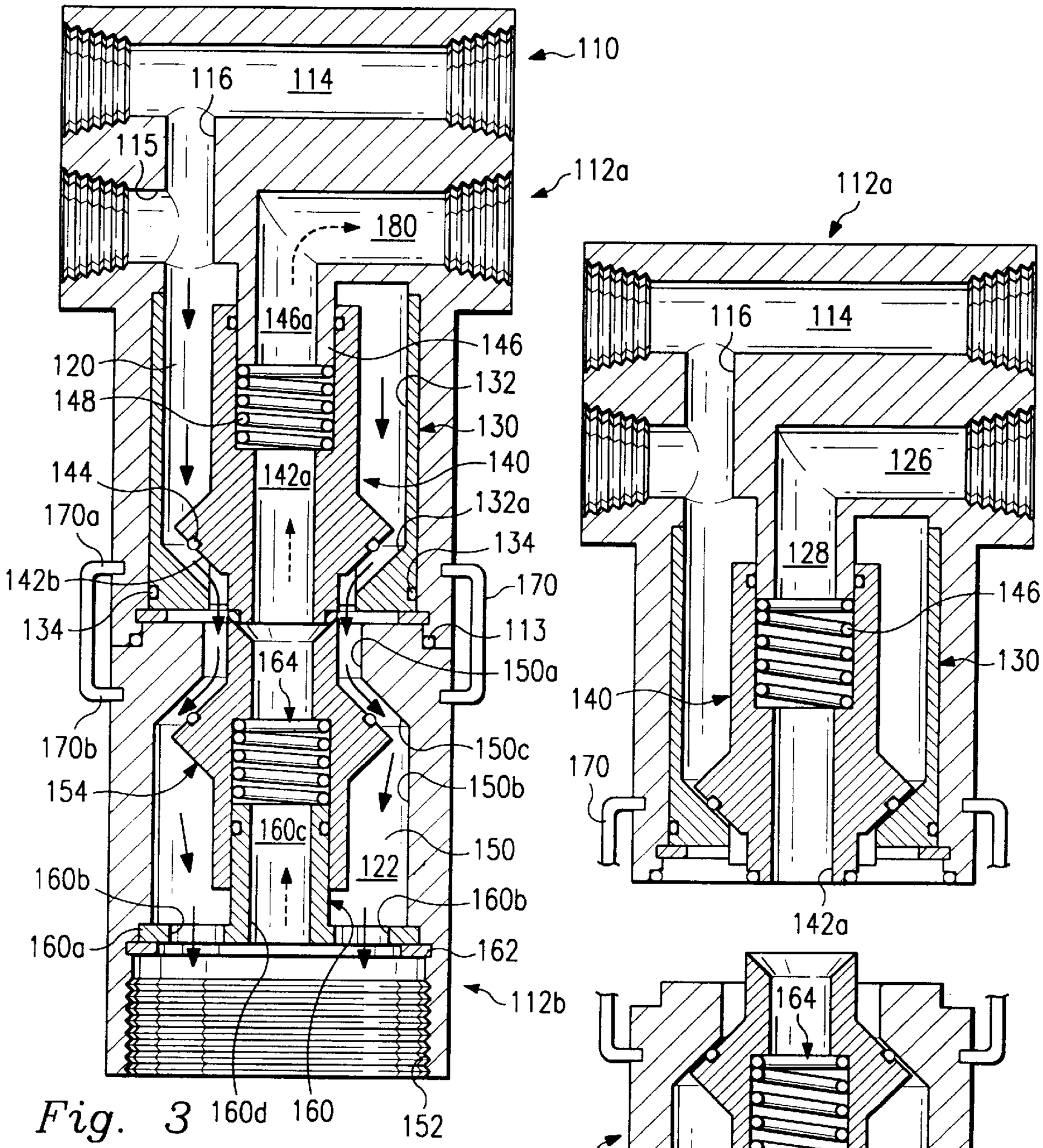


Fig. 3

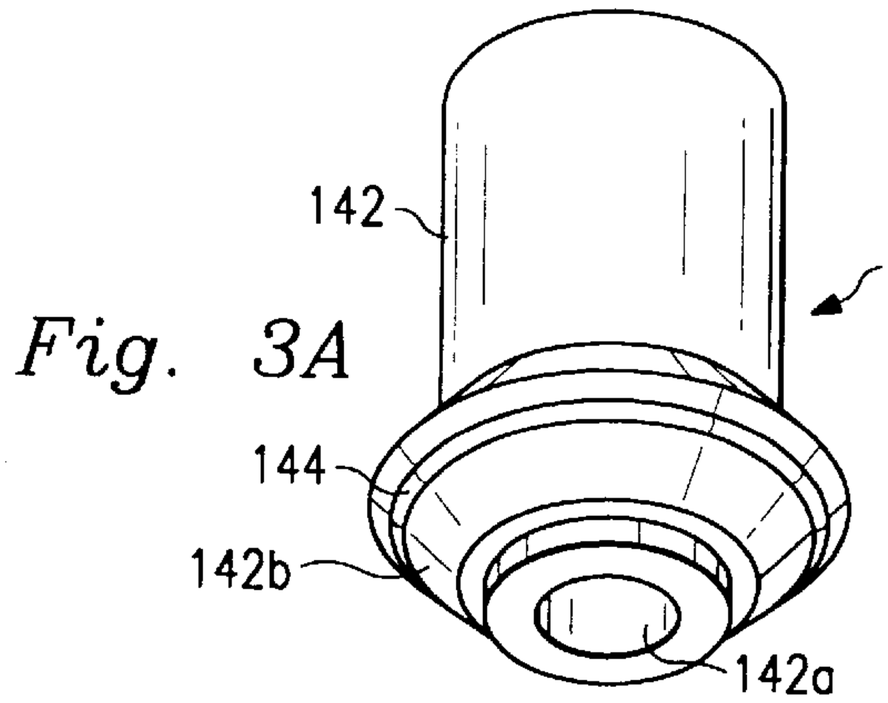


Fig. 3A

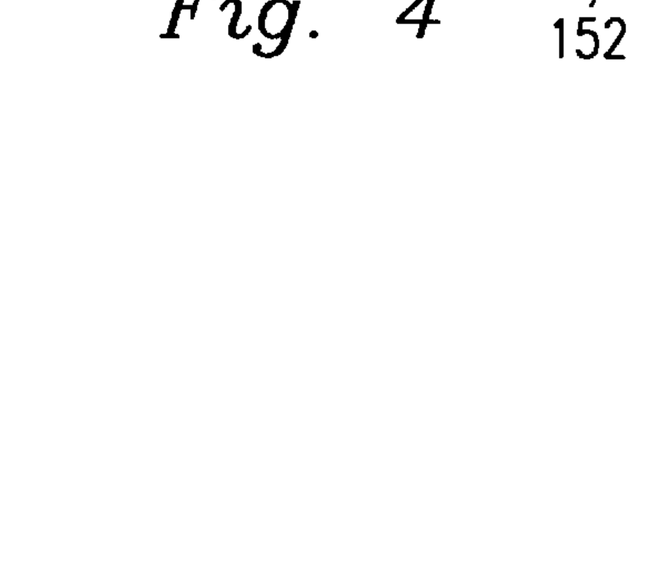


Fig. 4

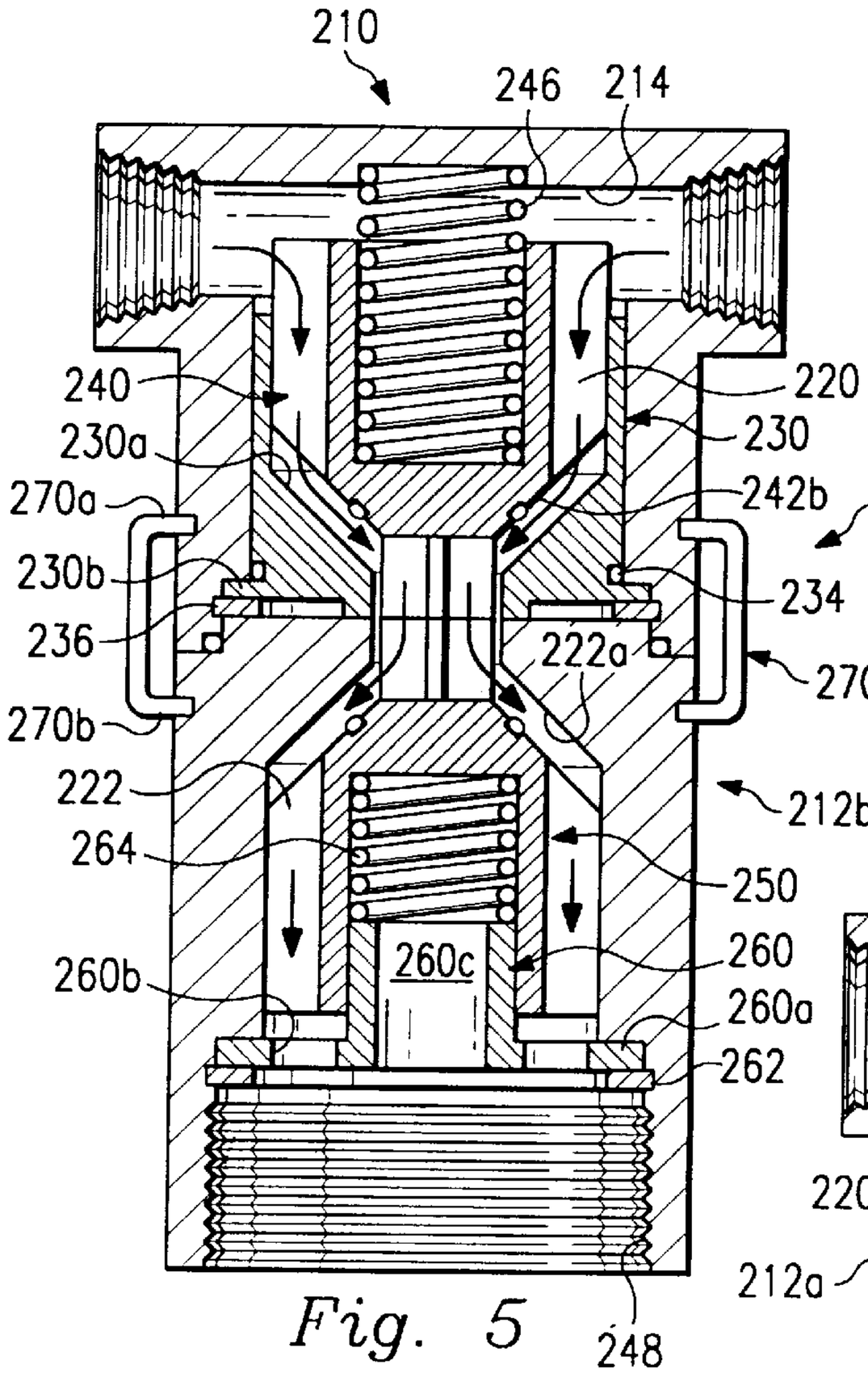
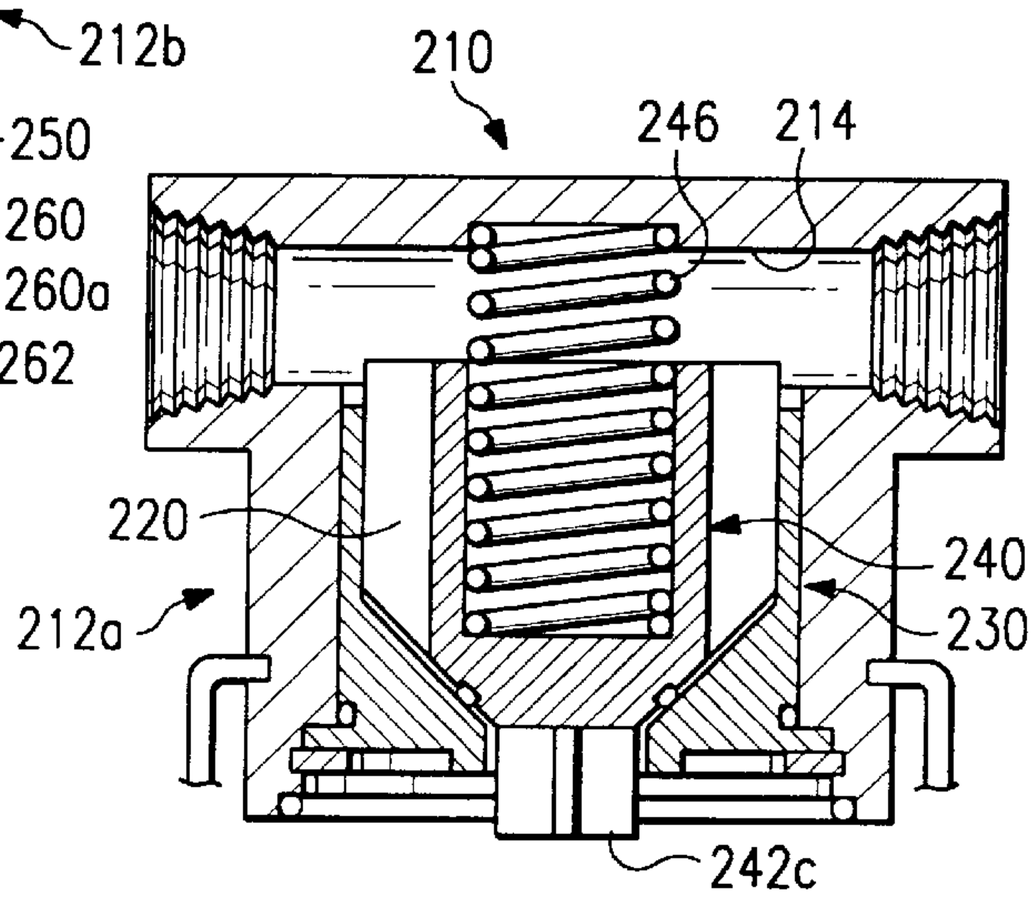


Fig. 5



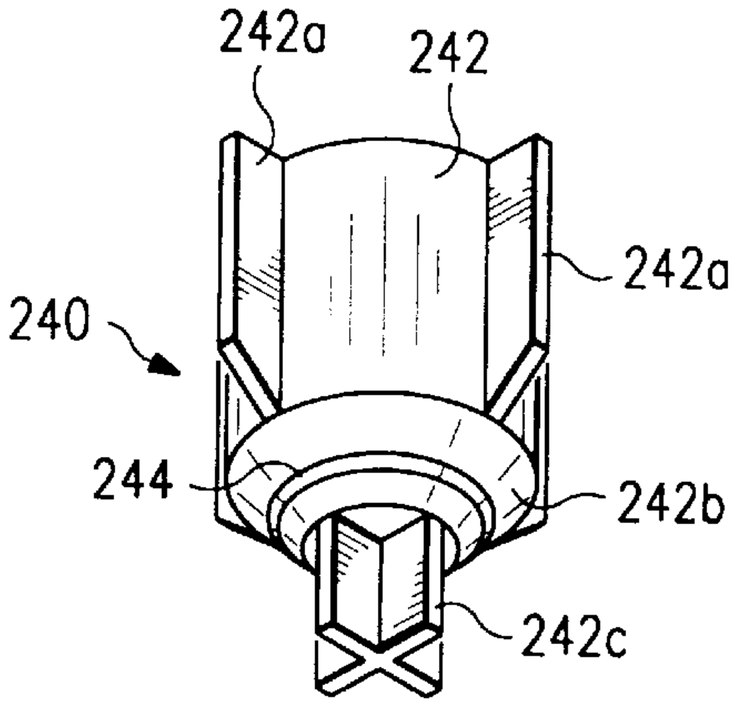


Fig. 5A

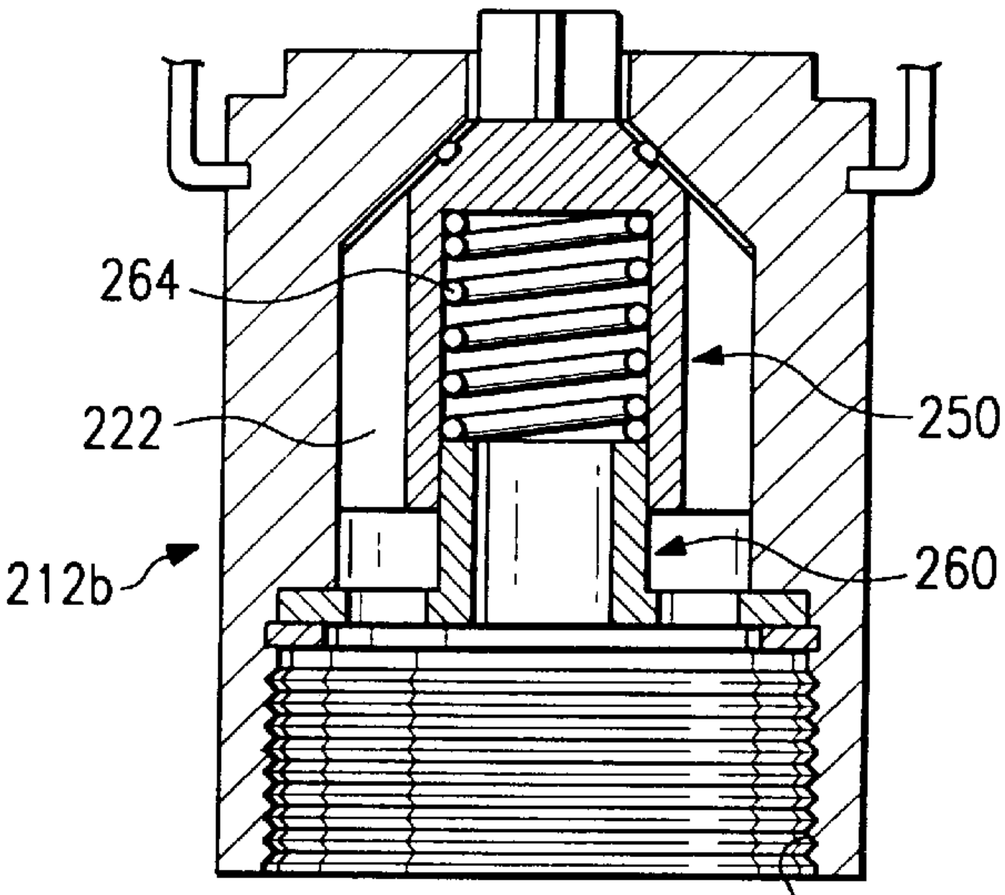
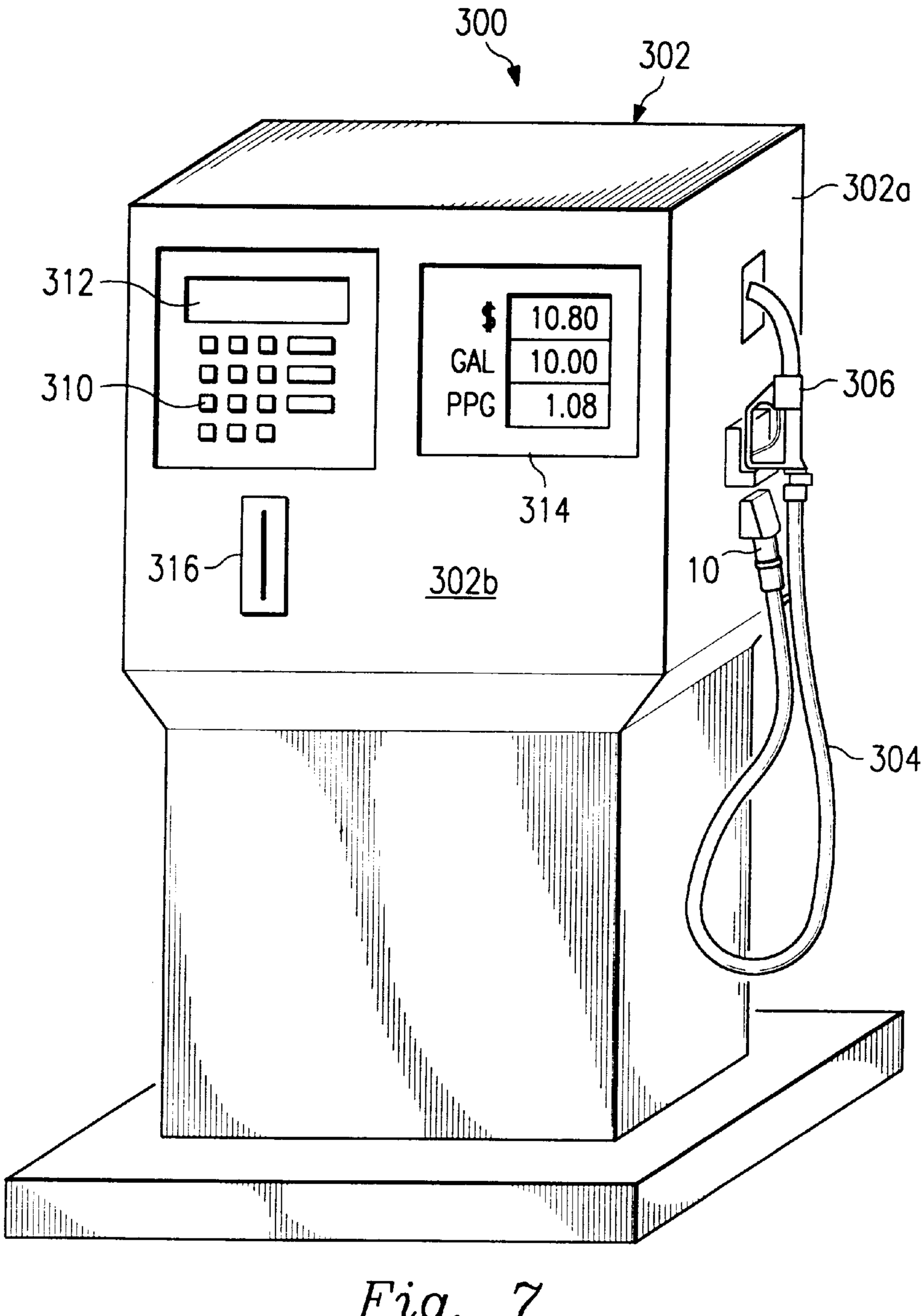


Fig. 6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302a
312
310
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GAL 10.00
PPG 1.08
314
306
316
302b
10
304

Fig. 7

BREAKAWAY HOSE COUPLING FOR FUEL DISPENSERS

BACKGROUND OF THE INVENTION

This invention relates to a breakaway hose coupling for fuel dispensers and, more particularly, to such a coupling for releasably coupling a conduit at a fuel dispensing unit to a hose connected to a nozzle for dispensing the fuel.

Service stations having one or more gasoline dispensing units have long had a problem with vehicles pulling away from the dispensing unit with the dispensing nozzle still inserted in the vehicle's tank, or with the nozzle or dispensing hose otherwise secured or hung on the vehicle. Such incidents usually result in damage to the dispensing unit and/or breakage of the dispensing hose, and repairing the resulting damage to the dispensing pump or hose can be very costly. Further, the fuel spillage which can result from such damage can create hazardous conditions.

These problems are compounded in connection with service stations which also include a system for recovering vapor in the vehicle tanks when the gasoline is dispensed into the tank. Although breakaway couplings have been designed for these type of gasoline dispensing and vapor recovery systems that provide for flow-through fluid communication of both fuel and recovered fuel vapor (such as the coupling disclosed in U.S. Pat. No. 5,209,262) they are less than satisfactory. For example, these type of couplings are relatively heavy, bulky and expensive and often impede the flow of the fuel and/or vapor to and from the dispensing unit.

Therefore, what is needed is a breakaway coupling of the above type which disengages and terminates the flow of fuel and vapor from a gasoline dispensing unit in response to disengaging force in excess of a predetermined value being exerted on the coupling, yet is light, compact and inexpensive and does not impede the flow of fuel or vapor.

SUMMARY OF THE INVENTION

Therefore, the breakaway hose coupling of the present invention includes a removable housing detachably connected to a fixed housing. A sealing member in the fixed housing is urged towards a seat in the fixed housing to prevent fluid flow through the fixed housing, and a member in the second housing is urged into engagement with the sealing member in the first housing to urge the latter sealing member away from the seat. The connection between the housings is released in response to a predetermined force acting on the second housing and the member in the second housing disengages from the sealing member in the first housing . As a result, the sealing member in the first housing is urged against the seat to prevent fluid flow through the fixed housing.

The coupling of the present invention enjoys the advantage of disengaging and terminating the flow of fluid and vapor from a gasoline dispensing device in response to disengaging force in excess of a predetermined value being exerted on the coupling. The coupling of the present invention is also light, compact and inexpensive to manufacture and maintain, and does not impede flow of the fuel or vapor.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a sectional view of the coupling of the present invention shown in its normal assembled condition.

FIG. **1A** is an isometric view of a component of the coupling of FIG. **1**.

FIG. **2** is a sectional view of the coupling of FIG. **1** in its separated condition.

FIG. **3** is a sectional view of a coupling according to an alternate embodiment of the present invention shown in its normal assembled condition.

FIG. **3A** is an isometric view of a component of the coupling of FIG. **3**.

FIG. **4** is a sectional view of the coupling of FIG. **3** in its separated condition.

FIG. **5** is a sectional view of a coupling according to another alternative embodiment of an the present invention shown in its normal assembled condition.

FIG. **5A** is an isometric view of a component of the coupling of FIG. **5**.

FIG. **6** is a sectional view of the coupling of FIG. **5** in its separated condition.

FIG. **7** is an isometric view of a gasoline dispensing unit incorporating the coupling of the embodiment of FIGS. **1**, **1A**, and **2**.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. **1** of the drawings, the reference numeral **10** refers, in general, to the coupling of the present invention which includes an upper housing portion **12***a* as viewed in the drawing, and a lower housing portion **12***b*. Although not shown in the drawings, it is understood that the upper housing portion **12***a* is bolted, or otherwise attached, to a dispensing unit at a gasoline service station, or the like, and the lower housing portion **12***b* is connected to the upper housing portion in a manner to be described. The lower end of the housing portion **12***a* abuts the upper end of the housing portion **12***b,* and a seal ring **13** extends between the abutting ends.

The housing portion **12***a* has an enlarged upper end portion having a transverse bore **14** extending therethrough, with its respective end portions being internally threaded for connection to two conduits (not shown). A radial bore **15** extends into the housing portion **12***a* in a spaced, parallel relation to the bore **14** and is also internally threaded for connection to a conduit (not shown). It is understood that three sources of gasoline, normally stored in underground storage tanks, are connected to these conduits and are selectively introduced to the respective ends of the bore **14**, and to the end of the bore **15**. Therefore, when a customer selects one of the gasolines by actuating a switch, or the like, the selected gasoline flows from its storage tank to one if the end of the bore **14** or the end of the bore **15** for passage through the coupling **10** in a manner to be described.

An axial bore **16** extends through a portion of the housing portion **12***a* with its upper end in registry with the bores **14** and **15** and its lower end extending into a chamber **20** formed in the housing portion **12***a*. The upper end portion of the chamber **20** surrounds a portion of the bore **16** and the lower end of the chamber **20** extends to the lower end of the housing portion **12***a*. A chamber **22** is formed in the housing portion **12***b* and is in axial alignment with the chamber **20** of the housing portion **12***a*. The inner surface of the housing portion **12***b* defining the chamber **22** is configured so as to define an upper portion **22***a* having a relatively small diameter, a lower portion **22***b* having a relatively large diameter, and a tapered portion **22***c* connecting the upper portion to the lower portion. The upper end of the upper chamber portion **22***a* registers with the chamber **20** of the upper housing portion **12***a*, and the lower end of the lower chamber portion **22***b* registers with an enlarged, internally threaded bore **24** for receiving a hose assembly as will be explained.

Fuel from a storage tank thus flows into the housing portion **12***a* through one of the ends of the bore **14**, or the end of the bore **15**, before entering the bore **16** and flowing through the chamber **20** and **22** of the housing portions **12***a* and **12***b*, respectively, in a manner to be described. It is understood that the above-mentioned hose assembly includes a fixture that connects to the bore **24**, and an inner hose extending from the fixture for receiving the fuel and passing it to a dispensing nozzle for discharging the fuel into a vehicle tank.

A substantially ring-shaped seating member **30** is disposed in the chamber **20** of the upper housing portion **12***a* and its lower end portion extends into a counterbore formed in the upper end portion of the lower housing portion **12***b*. A flange **30***a* is formed on the outer surface of the member **30** and extends between the corresponding ends of the housing portions **12***a* and **12***b* to secure the member relative to the housing portions. The member **30** has a through bore **32** that has an outwardly tapered upper end portion **32***a*. Two sealing rings **34***a* and **34***b* are provided in grooves formed in the outer surface of the member **30** and engage corresponding surfaces of the housing portion **12***a* and the housing portion **12***b*, respectively.

A sealing member **40** is mounted for reciprocal movement in the chamber **20** and is better shown in FIG. **1**A. The member **40** is in the form of a cylinder **42** having four angularly-spaced windows **42***a* extending therethrough. The base **42***b* of the cylinder **42** is tapered in a manner to correspond to the taper of the end portion **32***a* of the bore **32***a* of the seating member **30**. The member **40** also includes a crosspiece **42***c* that extends from the base **42***b* and has an X-shaped cross section. In the assembled position of the coupling **10** shown in FIG. **1**, a portion of the cross-piece **42***c* of the member **40** extends in the bore **32** of the member **30**, and the tapered base **42***b* extends in a slightly-spaced relation to the tapered end portion **32***a* of the bore **32** to permit fuel flow therebetween as will be further described. A seal ring **44** is fitted in a groove formed in the outer surface of the base **42***b* for sealingly engaging the tapered end portion **32***a* of the seating member under conditions to be described.

A cylindrical flange **46** is formed in the housing portion **12***a* and defines the bore **16**. The flange **46** extends within the upper end portion of the sealing member **40** to support it for axial movement in the chamber **22** as will be described. A spring **48** extends around the flange **46** and engages the upper end of the sealing member **40** and urges it downwardly, for reasons to be described.

A sealing member **50** is mounted for reciprocal movement in the chamber **22** and, since it is identical to the sealing member **40**, it will be not be described in detail. The sealing member **50** is disposed in the chamber **22** in an inverted position when compared to the sealing member **40**. In the assembled position of the coupling **10** shown in FIG. **1**, the tapered base of the sealing member **50** is in a slightly-spaced relation to the tapered chamber portion **22***c*, and the end of the cross-piece of the member **50** abuts the end of the cross-piece **42***c* of the member **40**

A cylindrical adapter **60** is secured in the lower chamber portion **22***b* and has an outwardly-extending flange **60***a* at its lower end that is engaged by a retaining ring **62** that is secured in the upper end of the bore **24** to retain the adapter in the chamber. A plurality of angularly-spaced openings, two of which are shown by the reference numeral **60***b*, are formed through the flange **60***a*, for reasons to be described. The adapter **60** has an axial bore **60***c* that registers with the chamber portion **22***b* and the bore **24** for reasons to be described.

The lower portion of the cylinder of the sealing member **50** extends over the upper end portion of the adapter **60** so that the adapter supports and guides the sealing member during its movement in the chamber **22**, as will be described. A spring **64** extends between the flange **60***a* of the adapter **60** and the lower end of the member **50** to urge the latter member upwardly into engagement with the sealing member **40**. The springs **48** and **64** are designed so that they maintain the sealing members **40** and **50** in a slightly-spaced position from the tapered bore portion **32***a* of the seal member **30** and the tapered chamber portion **22***b*, respectively, in the assembled position of the coupling **10** shown in FIG. **1**.

A cylindrical retaining collar **70** extends around the lower end portion of the housing portion **12***a* and the upper end portion of the housing portion **12***b*. The collar **70** has two inwardly-directed flanges **70***a* and **70***b* that extend in annular grooves formed in the housing portions **12***a* and **12***b*, respectively. The design of the collar **70** is such that it normally secures the housing portions **12***a* and **12***b* in the assembled position shown in FIG. **1** yet will break in response to a disengaging force in excess of a predetermined value being exerted on the coupling **10** to release the housing portion **12***b* from the portion **12***a* as will be described.

A radial bore **80** extends into the enlarged end portion of the housing portion **12***a* and is adapted to be connected, at its end, to a conduit (not shown) extending from one of the above-mentioned storage tanks for passing vapor recovered from the above gasoline dispensing nozzle back to the storage tank. To this end, a crescent shaped passage **82** is formed through the housing portions **12***a* and **12***b*, with its lower end registering with the openings **60***b* in the flange **60***a* and its upper end registering with the bore **80**. It is understood that the above-mentioned hose assembly includes an outer hose connected to the above-mentioned fixture and registering with the passage **82** for introducing vapor from the vehicle tank into the passage. Vapor from the vehicle tank thus passes from the above-mentioned dispensing nozzle and hose into the bore **24** and the passage **82** before passing through the latter passage and exiting the bore **80** into a conduit connected to the latter bore for passage to a storage tank.

The design is such that the counteracting forces of the springs **46** and **64** maintain the sealing members **40** and **50** in their positions shown in FIG. **1**, i.e., with the tapered surfaces **42***b* of the member **40** and the tapered surface of the member **50** in a spaced relation to the tapered bore portion **32***a* and the tapered chamber portion **22***c*, respectively. When fluid is introduced to one of the ends of the bore **14** or into the bore **15**, it flows into and through the axial bore **16** and into the interior of the sealing member **40** in the chamber **20**, as shown by the solid flow arrows. The fuel then passes radially outwardly through the windows **42***a* of the cylinder **42** of the sealing member **40** and through the passage defined between the outer tapered surface of the base member **42***b* and the tapered bore portion **32***a*. From the latter passage, the fuel passes axially downwardly and through the spaces defined between the cross-piece **42***b* of the member **40** and the corresponding surface of the member **30** defining the bore **32**.

The fuel then enters the lower housing portion **12***b* and passes through the spaces defined between the cross-piece of the member **50** and the corresponding inner surfaces of the housing portion **12***b*. From the latter spaces, the fuel flows in the passage defined between the tapered outer surface of the member **50** and the surface of the housing portion **12***b* defining the tapered chamber portion **22***c*. The fuel then passes radially inwardly through the windows in the member

50 into and through the cylinder of the latter member, and into the bore 60*a* of the adapter 60. The fuel then flows into the bore 24 and exits the coupling 10 by passing into the above-mentioned inner hose of the hose assembly connected to the bore 24 for dispensing, via a nozzle connected to the latter hose, into a vehicle tank. It is understood that a pump, or the like, would be provided to pump the fuel, in a conventional manner.

Vapor passes from the vehicle tank via a vapor recovery hose also connected to the above dispensing nozzle, through the outer hose of the above-mentioned hose assembly into the bore 24 and upwardly through the passage 82 and the housing portions 12*a* and 12*b* as shown by the dashed flow arrows. The vapor then exits the coupling 10 via the bore 80 and passes, via a conduit connected to the latter bore, to the underground storage tank. It is understood that a vacuum pump, or the like, would be provided, to induce this flow of vapor, in a conventional manner.

In the event a vehicle being serviced pulls away from the dispensing unit with the dispensing nozzle still inserted in the vehicle's tank, or with the nozzle or dispensing hose otherwise secured or hung on the vehicle, a force is exerted on the housing portion 12*b* by virtue of it being connected to the hose extending from the nozzle. This causes the collar 70 to break and thus releases the housing portion 12*b* from the housing portion 12*a* as shown in FIG. 2. In this released position, the sealing members 40 and 50 are no longer in engagement, and the spring 48 thus urges the sealing member 40 into sealing engagement with the tapered bore portion 32*a* to block any of the above-described flow of the fuel and the vapor through the housing portion 12*a* and thus prevent spillage of the hazardous fuel.

After the dispenser is turned off and the pressure is relieved, the body portions 12*a* and 12*b* can be reassembled and the collar 70 replaced with a new collar which is used to reconnect the housing portions 12*a* and 12*b* as described above.

The coupling 10 of the present invention thus enjoys the advantage of disengaging and terminating the flow of fluid and vapor from a gasoline dispensing device in response to disengaging force in excess of a predetermined value being exerted on the coupling. The coupling of the present invention is also light, compact and inexpensive to manufacture and maintain, and does not impede flow of the fuel or vapor.

An alternate embodiment of the present invention is shown in FIGS. 3, 3A and 4. The coupling according to this embodiment is referred to, in general by the reference numeral 110 and includes an upper housing portion 112*b* as viewed in the drawing, and a lower housing portion 112*b*. Although not shown in the drawings, it is understood that the upper housing portion 112*a* is bolted, or otherwise attached, to a dispensing unit at a gasoline service station, or the like; and the lower housing portion is connected to the upper housing portion in a manner to be described. The lower end of the housing portion 112*a* abuts the upper end of the housing portion 112*b,* and a seal ring 113 extends between the abutting ends.

The housing portion 112*a* has an enlarged upper end portion having a transverse bore 114 extending therethrough with it respective end portions being internally threaded for connection to two conduits (not shown). A radial bore 115 extends into the housing portion 112*a* in a spaced, parallel relation to the bore 114 and is also internally threaded for connection to a conduit (not shown). It is understood that three sources of gasoline, normally stored in underground storage tanks, are connected to these conduits and are selectively introduced to the respective ends of the bore 114, and to the end of the bore 115, all in a conventional manner.

An axial bore 116 registers with the bores 114 and 115 and extends to a chamber 120 formed in the upper housing portion 112*a*. A cylindrical seating member 130 is disposed in the chamber 120, and has a through axial bore 132 having a tapered lower portion 132*a*. A seal ring 134 is provided in a groove formed in the outer surface of the cylinder portion 142*b* and engages a corresponding surface of the housing portion 112*a*.

A sealing member 140 is mounted for reciprocal movement in the chamber 120 and is better shown in FIG. 3A. The member 140 is in the form of a cylinder 142 having a through bore 142*a* and an enlarged base 142*b* which is tapered in a manner to correspond to the tapered portion 132*a* of the bore 132 of the seating member 130. In the assembled position of the coupling 110 shown in FIG. 3, the tapered base 142*b* of the member 140 extends in a slightly-spaced relation to the tapered bore portion 132*a* to permit fuel flow therebetween as will be further described. A seal ring 144 is fitted in a groove formed in the outer surface of the base 142*b* for sealingly engaging the tapered bore portion 132*a* under conditions to be described.

A cylindrical flange 146 is formed in the housing portion 112*a* and is surrounded by the chamber 120. The flange 146 defines a bore 146a and extends within the upper end portion of the sealing member 140 to support it for axial movement in the chamber 122. A spring 148 extends between the distal end of the flange 148 and a shoulder formed in the inner surface of the sealing member 140 to urge the latter member downwardly, for reasons to be described. The bore 146*a* of the flange 146 registers with the bore 142*a* of the sealing member 142.

A chamber 150 is formed in the housing portion 112*b* and is in axial alignment with the chamber 120 of the housing portion 120*a*. The inner surface of the housing portion 112*b* defining the chamber 150 is configured so as to define an upper portion 150*a* having a relatively small diameter, a lower portion 150*b* having a relatively large diameter, and a tapered portion 150*c* connecting the upper portion to the lower portion. The lower end of the lower chamber portion 150*b* registers with an enlarged, internally threaded bore 152 for receiving a hose assembly comprising an inner and an outer hose, as will be explained.

A sealing member 154 is mounted for reciprocal movement in the chamber 150 and, since it is identical to the sealing member 140, it will be not be described in detail. The sealing member 154 is disposed in the chamber 150 in an inverted position when compared to the sealing member 140. In the assembled position of the coupling 110 shown in FIG. 3, the tapered base of the sealing member 154 is in a slightly-spaced relation to the tapered chamber portion 150*c* and the upper end of the member 154 abuts the lower end of the member 140.

A cylindrical adapter 160 rests in the lower portion of the chamber 150 of the housing portion 112*b* and has an outwardly-extending flange 160*a* at its lower end that is engaged by a retaining ring 162 that is secured in the upper end of the bore 118 to retain the adapter in the chamber. A plurality of angularly-spaced openings 160*b,* two of which are shown in FIG. 3, are formed through the flange 160*a* that register with the chamber 150 and the bore 152. The adapter 160 has an axially-extending bore 160*c* extending for the length thereof that registers with the bore of the sealing member 154. Thus, a continuous bore is defined that includes the latter two bores as well as the bore 142*a* of the

sealing member **142** and the bore **146***a* of the flange **146** and the bore **180** in the upper housing portion **112***a*.

The lower portion of the cylinder of the sealing member **154** extends over the upper end portion of the adapter **160** to permit slidable movement therebetween. One end of a spring **164** abuts a shoulder formed in the internal surface of the sealing member **154** and its other end abuts the upper end of the adapter **160** to urge the member **150** upwardly against the member **140**.

The springs **148** and **164** are designed so that their respective counteracting forces applied to the sealing members **140** and **150** normally maintain the latter members in a slightly-spaced position from the tapered bore portion **132***a* and the tapered surface defining the chamber portion **150***c*, respectively.

Fuel thus enters one of the bores **114** or **115** and passes through the housing portions **112***a* and **112***b* as indicated by the solid arrows in FIG. **3** before passing into the enlarged bore **152** in the housing portion **112***b*. It is understood that the above-mentioned hose assembly includes an outer hose that extends in the bore **152** and is connected to the openings **160***b* of the adapter **160** for receiving the fuel and passing it to a dispensing nozzle connected to the hose assembly for dispensing into the vehicle tank.

A cylindrical retaining collar **170** extends around the lower end portion of the housing portion **112***a* and the upper end portion of the housing portion **112***b*. The collar **170** has two inwardly-directed flanges **170***a* and **170***b* that extend in annular grooves formed in the housing portions **112***a* and **112***b*, respectively. The design of the collar **170** is such that it normally secures the housing portions **112***a* and **112***b* in the assembled position shown in FIG. **3** yet will break in response to a disengaging force in excess of a predetermined value being exerted on the coupling **110** to release the housing portion **112***b* from the portion **112***a* as will be described.

A radial bore **180** extends into the housing portion **112***a* and is adapted to be connected, at its end, to a conduit (not shown) extending from one of the above-mentioned underground storage tanks for passing vapor recovered from the above gasoline dispensing nozzle back to the storage tank. The other end of the bore **180** registers with the bore **146***a* of the flange **146**.

It is understood that the above-mentioned hose assembly includes an inner hose extending in the enlarged bore **152** and connected to the bore **160***c* of the adapter **160** for introducing vapor from the vehicle tank into the latter bore. The vapor thus passes, through the housing portions **112***a* and **112***b* in a manner to be described and in a path shown by the dashed flow arrows before exiting though the bore **180** into a conduit connected to the bore for passage to a storage tank.

In operation, and assuming the coupling **110** is in its assembled condition of FIG. **3**, when fluid is introduced to one of the ends of the bore **114** or into the bore **115**, it flows into and through the interior of the chamber **120**, as shown by the solid flow arrows. The fuel then flows through the passage defined between the tapered surface **142***b* of the sealing member **140** and the tapered bore portion **132***a*. From the latter passage, the fuel passes axially downwardly and through the annular space defined between the lower end portion of the sealing member **140** and the corresponding surface of the member **130** defining the tapered bore **132***a*.

The fuel then flows into the chamber **150** of the lower housing portion **112***b* and passes through the annular space defined between the upper end of the sealing member **154** and the corresponding surface of the housing portion **112***b* defining the chamber portion **150***a*. From the latter space, the fuel flows in the passage defined between the tapered outer surface of the member **154** and the corresponding surface of the housing portion **112***b* defining the chamber portion **150***c*. The fuel then exits the chamber **150** and flows through the openings **160***b* of the adapter **160** and into the aforementioned outer hose connected to the latter openings, for dispensing into the vehicle tank. It is understood that a pump would be provided to pump the fuel, in a conventional manner.

Vapor passes from the vehicle tank into the bore **160***c* of the adapter **160**, via the above-mentioned inner hose also connected to the above dispensing nozzle. The vapor flows through the bore **160***c*, through the bore of the sealing member **154** into the bore **142***a* of the sealing member **140**. From the latter bore the vapor passes into and through the bore **146***a* of the sealing member **140**, through the bore **146***a* of the flange **146**, and exits the coupling **110** via the bore **180** before it flows, via a conduit connected to the latter bore, to the underground storage tank. It is understood that a vacuum pump, or the like, would be provided, to induce this flow of vapor, in a conventional manner.

In the event a vehicle being serviced pulls away from the dispensing unit with the dispensing nozzle still inserted in the vehicle's tank, or with the nozzle or dispensing hose otherwise secured or hung on the vehicle, a force is exerted on the housing portion **112***b* by virtue of it being connected to the hose extending from the nozzle. This causes the collar **170** to break and thus releases the housing portion **112***b* from the housing portion **112***a* as shown in FIG. **4**. In this released position, the sealing members **140** and **154** are no longer in engagement, and the spring **146** thus urges the sealing member **140** into sealing engagement with the tapered bore portion **132***a* to block any of the above-described flow of the fuel and the vapor through the housing portion **112***a*.

After the dispenser is turned off and the pressure is relieved, the housing portions **112***a* and **112***b* can be reassembled and the collar **170** replaced with a new collar which is used to reconnect the housing portions as described above.

The coupling of the embodiment of FIGS. **3**, **3**A, and **4** thus enjoys all of the advantages of the previous embodiment while accommodating a different configuration of the fuel and vapor hoses.

Another alternate embodiment of the present invention is shown in FIGS. **5**, **5**A, and **6** and is designed for gasoline dispensing systems that do not included a vapor recovery system. The coupling according to this embodiment is referred to, in general by the reference numeral **210** and includes an upper housing portion **212***a* as viewed in the drawing, and a lower housing portion **212***b*.

Although not shown in the drawings, it is understood that the upper housing portion **212***a* is bolted, or otherwise attached, to a dispensing unit at a gasoline service station, or the like; and the lower housing portion is connected to the upper housing portion in a manner to be described. The lower end of the housing portion **212***a* abuts the upper end of the housing portion **212***b*, and a seal ring **213** extends between the abutting ends.

The housing portion **212***a* has an enlarged upper end portion having a transverse bore **214** extending therethrough with its respective end portions being internally threaded for connection to two conduits (not shown). It is understood that two sources of gasoline, normally stored in underground storage tanks, are connected to these conduits and are

selectively introduced to the respective ends of the bore **214** all in a conventional manner.

A chamber **220** is formed in the upper housing portion **212***a* and a cylindrical seating member **230** is disposed in the chamber and defines an internal tapered surface **230***a*. A seal ring **234** is provided in a groove formed in the outer surface of the member **230** and engages the corresponding inner surface of the housing portion **212***a*. An annular flange **230***b* is formed on the lower end of the seating member **230** which is engaged by a retaining ring **236** extending in a groove formed in the inner surface of the housing portion **212***a* to retain the member **230** in the chamber **220**.

A sealing member **240** is mounted for reciprocal movement in the chamber **220** and is better shown in FIG. **5**A. The member **240** is in the form of a cylinder **242** having four angularly-spaced wings **242***a* extending therefrom. The base **240***b* of the cylinder **242** has a tapered outer surface that corresponds to the tapered surface **230***a* of the member **230**. A cross-piece **242***c* extends from the base **242***b* and has an X-shaped cross section.

A seal ring **244** is fitted in a groove formed in the outer surface of the base **242***b* of the cylinder **242**. The base **242***b* normally extends with its tapered surface in a slightly-spaced relation to the tapered surface **230***a* of the member **230** to permit fuel flow therebetween, and the cross-piece **242***c* of the member **240** extends through the bore of the seating member **230**. Also, the outer edges of the wings **242***a* extend in very close proximity to the inner wall of the housing portion **212***a* to guide and support the sealing member **240** during its reciprocal movement in the housing portion, as will be explained.

A spring **246** extends in the interior of the sealing member **240** with its upper end extending through the bore **214** and against a surface of the housing portion **212***a* defining the bore. The spring **246** urges the sealing member **240** downwardly, for reasons to be described.

The lower housing portion **212***b* defines a chamber **222** in its interior having a tapered portion **222***a* that defines a portion of the latter chamber. The lower end of the chamber **222** registers with an enlarged bore **248** formed in the lower end portion of the housing portion **212***b*. The bore **248** is internally threaded to enable it to be connected to a hose assembly (not shown) attached to a gasoline dispensing nozzle.

A sealing member **250** is mounted for reciprocal movement in the chamber **222** and, since it is identical to the sealing member **240**, it will be not be described in detail. The sealing member **250** is disposed in the chamber **222** in an inverted position when compared to the sealing member **240**, with the tapered base of the sealing member **250** normally in a slightly-spaced relation to the tapered surface **222***a* and with its upper end engaging the lower end of the sealing member **240**.

An adapter **260** is disposed in the lower portion of the chamber **222** and has an outwardly-extending flange **260***a* at its lower end that is engaged by a retaining ring **262** that is secured in the upper end of the bore **248** to retain the adapter in the chamber. A plurality of angularly-spaced openings two of which are shown by the reference numeral **260***b*, are formed through the flange **260***a* that register with the chamber **222** and the bore **248**.

The lower portion of the cylinder of the sealing member **250** extends over the upper end portion of the adapter **260** to support and guide the sealing member during its reciprocal movement in the chamber **222** for reasons to be described. A spring **264** extends in the interior of the sealing member **250** with its lower end abutting the upper end of the adapter **260** and its upper end engaging an inner surface of the member **250**. Thus, the spring **264** urges the member **250** upwardly into engagement with the sealing member **240**, for reasons to be described. The design is such that the counteracting forces applied by the springs **246** and **264** maintain the sealing members **240** and **250** in a slightly-spaced position from the tapered portion **230***a* of the member **230**, and the tapered surface **222***a* in the lower housing portion **212***b*, respectively.

A cylindrical retaining collar **270** extends around the lower end portion of the housing portion **212***a* and the upper end portion of the housing portion **212***b*. The collar **270** has two inwardly-directed flanges **270***a* and **270***b* that extend in annular grooves formed in the housing portions **212***a* and **212***b*, respectively. The design of the collar **270** is such that it normally secures the housing portions **212***a* and **212***b* in the assembled position shown in FIG. **5** yet will break in response to a disengaging force in excess of a predetermined value being exerted on the coupling **210** to release the housing portion **212***b* from the portion **212***a* as will be described.

In operation, and assuming the coupling **210** is in its assembled condition of FIG. **5**, when fluid is introduced to one of the ends of the bore **214**, it flows into and through the chamber **220** and between the wings **242***a* of the member **240**. The fuel then flows through the passage defined between the tapered surface **242***b* of the member **240** and the tapered surface **230***a*. From the latter passage, the fuel passes axially downwardly in the chamber **222** and around the cross-piece **242***c* of the member **240** and into the chamber **222** of the housing portion **212***b*.

The fuel then flows into and through a bore formed in the upper end portion of the lower housing portion **212***b* and around the cross-piece of the member **250** before passing through the passage defined between the tapered outer surface of the member **250** and tapered chamber portion **222***a*, as shown by the flow arrows. The fuel then flows through the chamber **222** and around the wings of the member **250** before flowing through the openings **260***b* and into the enlarged bore **248**. The fluid then exits the coupling **210** through the aforementioned hose assembly connected to the openings **260***b* and to the nozzle for dispensing the fuel into a vehicle tank. It is understood that a pump, or the like, would be provided to pump the fuel, in a conventional manner.

In the event a vehicle being serviced pulls away from the dispensing unit with the dispensing nozzle still inserted in the vehicle's tank, or with the nozzle or dispensing hose otherwise secured or hung on the vehicle, a force is exerted on the housing portion **212***b* by virtue of it being connected to the hose extending from the nozzle. This causes the collar **270** to break and thus releases the housing portion **212***b* from the housing portion **212***a* as shown in FIG. **6**. In this released position, the sealing members **240** and **250** are no longer in engagement, and the spring **246** thus urges the sealing member **240** into sealing engagement with the tapered surface **230***a* of the seating member **230**. This blocks any of the above-described flow of the fuel through the housing portion **212***a* and thus prevents spillage of the fuel.

After the dispenser is turned off and the pressure is relieved, the body portions **212***a* and **212***b* can be reassembled and the collar **270** replaced with a new collar which is used to reconnect the housing portions as described above.

The coupling of the embodiment of FIGS. **5**, **5**A, and **6** thus enjoys all of the advantages of the previous embodi-

ment while accommodating a different configuration of the fuel and vapor hoses.

The coupling **10** of the embodiment of FIGS. **1**, **1**A, and **2** is shown connected to a gasoline dispensing unit **300** in FIG. **7**. The unit **300** includes a housing **302** having a side wall, or panel **302***a*, to which the housing portion **12***a* (FIG. **1**) of the coupling **10** is rigidly connected in any known manner and with the housing portion **12***b* of the coupling being connected to the housing portion **12***a* in the manner described above. In this context, a portion of the housing portion **12***a* extends into the interior of the housing **302**.

One end of a hose **304** assembly extends from the enlarged bore **18** (FIG. **1**) of the housing portion **12***b* of the coupling **10**, and a fuel nozzle **306** is connected to the other end of the hose for dispensing fuel to a vehicle tank.

It is understood that a plurality of conduits, or pipes, extend from an underground fuel storage tank (not shown) to the interior of the housing **302** where they are respectively connected to the ends of the bore **14** and to the end of the bore **15** internally of the housing. The coupling **10** can be mounted relative to the housing **302** in a manner so that the bores **14** and **15** extend in the interior of the housing **302** while the bore **18** extends outside the front panel of the housing.

The housing has a front panel **302***b* on which a keyboard **310**, two conventional graphics displays **312** and **314**, and a card reader **316** are mounted in a conventional manner. The graphics display **312** is designed to work in conjunction with the keyboard **310** to facilitate customer use of same, and the graphics display **314** includes a large, conventional, LCD panel for showing text and numerals, such as a price that corresponds to an amount of fuel dispensed, or other customer-related messages. The card reader **316** includes magnetic strip reading circuitry for reading credit cards, and the like, in a conventional manner. Although not shown in FIG. **7**, It is understood that components identical to the components shown in FIG. **7** can also be mounted on a back panel of the housing **302** and another coupling, hose and nozzle can extend from the other side wall of the housing so that two customers can be serviced with the unit **300**.

The coupling **10** thus functions in the manner described above to accommodate any vehicles pulling away from the dispensing unit **300** with the dispensing nozzle **306** still inserted in the vehicle's tank, or with the nozzle or dispensing hose **304** otherwise secured or hung on the vehicle. As a result, damage to the dispensing unit **300** and/or breakage of the dispensing hose **304** is prevented.

It is understood that variations may be made in the foregoing without departing from the scope of the invention. For example, the number of the above-mentions passages and opening can be varied within the scope of the invention. Also, the specific orientation of the coupling in each of the above embodiments and the reference to "upper" and "lower" is for the purpose of illustration only and does not limit the specific orientation or location of the couplings and their respective components. Also, the system and method of the present invention is not limited to a gasoline dispensing system but is equally applicable to any control system. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the scope of the invention.

What is claimed is:

1. A coupling for selectively passing two fluids, the coupling comprising:

a first housing having a first bore for passing one of the fluids therethrough and a second bore for passing the other fluid therethrough;

a seat formed in the first housing and surrounding the first bore;

a cylindrical guide flange formed in the first bore;

a first hollow cylindrical sealing member disposed in the first bore and extending over the guide flange for slidable movement relative to the guide flange, the sealing member receiving the fluid from the bore and having at least one window formed therethrough for discharging the fluid radially back into the bore;

a spring engaging the sealing member and normally urging the sealing member in a direction towards the seat;

a second housing having a first bore and a second bore;

a seat formed in the second housing and surrounding the first bore of the second housing;

a cylindrical guide flange formed in the first bore of the second housing;

a hollow cylindrical sealing member disposed in the first bore of the second housing and extending over the latter guide flange for slidable movement relative to the latter guide flange, the latter sealing member receiving the fluid from the first bore of the second housing and having at least one window formed therethrough for discharging the fluid radially back into the first bore of the second housing;

a spring engaging the latter sealing member and normally urging it in a direction towards the seat in the second housing; and

a connector detachably connecting the second housing to the first housing with the first bores in registry and with the second bores in registry, and with the sealing members engaging in a manner to urge each other against the forces of their respective springs and away from their respective seats to permit passage of the fluid through the first bores;

the connector responding to a predetermined force acting on the second housing for allowing the second housing to disconnect from the first housing, the second sealing members to disengage from each other, and each sealing member to move into engagement with its corresponding seat to prevent fluid flow through the first bore of the first housing and the first bore of the second housing.

2. The coupling of claim **1** wherein the first bore of each of said housings has an inlet for receiving the one fluid, and wherein the corresponding guide flange registers with the inlet for receiving the one fluid and passing it into its corresponding sealing member.

3. A gasoline dispensing system comprising:

a dispenser connected to a source of fuel;

a nozzle for dispensing the fuel into a vehicle and for recovering vapors from the vehicle;

a hose assembly connected to the nozzle; and

a coupling connecting the dispenser to the hose assembly for passing the fuel from the dispenser to the nozzle and for passing the vapor from the nozzle to the dispenser; the coupling comprising:

a first housing having a first bore for passing one of the fluids therethrough and a second bore for passing the other fluid therethrough;

a seat formed in the first housing and surrounding the first bore;

a cylindrical guide flange formed in the first bore;

a first hollow cylindrical sealing member disposed in the first bore and extending over the guide flange for

slidable movement relative to the guide flange, the sealing member receiving the fluid from the bore and having at least one window formed therethrough for discharging the fluid radially back into the bore;

a spring engaging the sealing member and normally urging it in a direction towards the seat;

a second housing having a first bore and a second bore;

a seat formed in the second housing and surrounding the first bore of the second housing;

a cylindrical guide flange formed in the first bore of the second housing;

a hollow cylindrical sealing member disposed in the first bore of the second housing and extending over the latter guide flange for slidable movement relative to the latter guide flange, the latter sealing member receiving the fluid from the first bore of the second housing and having at least one window formed therethrough for discharging the fluid radially back into the first bore of the second housing;

a spring engaging the latter sealing member and normally urging the latter sealing member in a direction towards the seat in the second housing; and

a connector detachably connecting the second housing to the first housing with the first bores in registry and with the second bores in registry, and with the sealing members engaging in a manner to urge each other against the forces of their respective springs and away from their respective seats to permit passage of the fluid through the first bores;

the connector responding to a predetermined force acting on the second housing for allowing the second housing to disconnect from the first housing, the second sealing members to disengage from each other, and each sealing member to move into engagement with its corresponding seat to prevent fluid flow through the first bore of the first housing and the first bore of the second housing.

4. The dispensing system of claim **3** wherein the first bore of each of said housings has an inlet for receiving the one fluid, and wherein the corresponding guide flange registers with the inlet for receiving the one fluid and passing it into its corresponding sealing member.

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